REMARKS

As a preliminary matter, although no understanding was reached, Applicant's representative thanks the Examiner for his time and courtesy of a phone interview on March 22, 2005, wherein potential amendments and the Tsilevich reference were discussed.

Claim 1, 2 and 4-58 are currently pending in the Application. Claims 12, 14, 24-44 and 47-54 have been previously withdrawn from consideration.

Claims 2, 15, 20, 24-44, 47-54 are cancelled in this Response. Accordingly, after entry of these amendments, claims 1, 4-14, 16-19, 21-23, 45, 46, and 55-58 are pending, of which claims 12 and 14 are withdrawn from consideration. Claims 1, 4, 6-10, 16, 17, 19, 45 and 55-58 are amended herein.

More specifically, claims 1 and 45 are amended herein to more particularly recite that the at least one layer is an energy absorbing layer that consists essentially of a metallic material and further, that the recited armor comprises at least one second layer of a metallic material that is contiguous with and metallurgically bonded to the at least one energy absorbing layer. Support for these amendments can be found in the Application, for example, at page 9, lines 11-18, and page 10, line 18 to page 11, line 1 (with reference to Fig. 2).

Claims 4, 6-8, and 19 are amended herein to more clearly recite the antecedent basis for certain elements recited therein.

Claim 9 is amended herein to recite, in part, that the first energy absorbing layer consists essentially of a metallic material that absorbs energy by a reversible phase change, the second energy absorbing layer consists essentially of a metallic material that absorbs energy by elastic deformation and exhibits elastic strain of at least 5%, and at least one of the first energy absorbing layer and the second energy absorbing layer is contiguous with and metallurgically bonded to the at least one second layer. Support for this amendment can be found in the Application, for example, at page 9, lines 1-10.

Claim 10 is amended herein to recite, in part, that the at least one energy absorbing layer is a first plate, the at least one second layer is a second plate, and the metallic material of said second plate is different from said metallic material of said first

plate. Support for this amendment can be found in the Application, for example, at page 6, line 17 and page 9, lines 11-12.

Claim 16 is amended to clarify the dependence of claim 16.

Claim 17 is amended to clarify the antecedent basis for "said metallic material". Support for this amendment can be found in the Application, for example, at page 9, lines 19-20.

Claims 55 and 57 are amended to more particularly point out certain claimed features. Support for these amendments can be found in the Application, for example, at page 6, lines 17-21.

Claims 56 and 58 are amended to more particularly point out certain claimed features. Support for these amendments can be found in the Application, for example, at page 9, lines 1 to page 10, line 5.

Applicant asserts that no new matter has been added to the Application by these amendments and requests that the Examiner enter the amendments into the record.

Claim Rejections

In the present Office Action, the Examiner rejects 1, 2, 4-11, 15-23, 45, 46, and 55-58, and objects to 13 as being dependent on a rejected base claim(s). These rejections and objection are addressed below in turn.

Rejections Under 35 U.S.C. §102(e) based on Tsilevich

In the Office Action, the Examiner rejects claims 1-2, 4-6, 10, 15, 17, 45, and 55-58 under 35 U.S.C. §102(e) based on Tsilevich. According to the Examiner, Tsilevich discloses an armor comprising:

a) a metallic material that undergoes a reversible phase change;

b) phase change at between -50°C and 200°C;

c) a metallic material that is Nitinol;

d) a second metallic plate; and

e) a third metallic plate.

As amended, claim 1 recites, with emphasis added:

> An armor capable of withstanding penetration by a projectile impacting the armor, the armor comprising at least one energy absorbing layer, said at least one energy absorbing layer consisting essentially of a metallic

> material that absorbs energy from the impacting projectile, said metallic material being at least one of a metallic material that undergoes a reversible phase change upon absorbing energy and a metallic material that exhibits an elastic strain deformation of at least 5%; and at least one second layer of a metallic material that is *contiguous with and metallurgically bonded to* the at least one energy absorbing layer.

Claim 45, as amended, recites with emphasis added:

> An article of manufacture including an armor capable of resisting penetration by a projectile impacting the armor, the armor comprising at least one energy absorbing layer, said at least one energy absorbing layer consisting essentially of a metallic material that absorbs energy from the impacting projectile, said metallic material being at least one of a metallic material that undergoes a reversible phase change upon absorbing energy and a metallic material that exhibits an elastic strain deformation of at least 5%; and at least one second layer of a metallic material that *is contiguous with and metallurgically bonded to* the at least one energy absorbing layer.

Applicant asserts that Tsilevich does not teach or disclose all of the elements of amended claims 1 and 45, and therefore does not anticipate these claims

In particular, Applicant submits that Tsilevich neither teaches nor suggests an armor having at least one energy absorbing layer and at least one second layer that is contiguous with and metallurgically bonded to the at least one energy absorbing layer. Even assuming arguendo that Tsilevich teaches a second (and third) metallic plate as suggested by the Examiner, Tsilevich does not teach or suggest that the second (or third) metallic plate is contiguous with and metallurgically bonded to the at least one energy absorbing layer.

For example, the Examiner indicates that the second and third metallic plates in Tsilevich are shown in Fig. 3, element 34 upper and lower, respectively. According to Tsilevich, the second and third metallic plates to which the Examiner refers form a housing into which a zigzag strip of a nickel-titanium shape memory alloy is placed. See Tsilevich at col. 3, lines 50-53. Further, Tsilevich teaches that a zigzag strip is placed within a housing and that "the space within housing 10 not occupied by spring 20 and strip 22 is loosely filled with a powdered material 21...." col. 3, lines 9-15. Accordingly, the housing and the strip in Tsilevich are neither contiguous nor metallurgically bonded to one another.

Further, there is no motivation in Tsilevich, either alone or in combination with the other references cited by the Examiner, to form an armor comprising an energy absorbing layer and at least one second layer that is contiguous with and metallurgically bonded to the at least one energy absorbing layer as recited in amended claims 1 and 45. As indicated in Tsilevich, "when strip 22 is heated above its transition temperature (generally between 80°C and 140°C), strip 22 tries to regain the flat shape it had prior to being bent." Col. 2, line 66 to col. 3, line 2. Since metallurgically bonding the strip in Tsilevich to the housing would interfere with the ability of the strip to regain the flat shape it had prior to being bent, and therefore destroy the function of the invention, one skilled in the art would not be motivated by the disclosure in Tsilevich to make an armor as recited in amended claims 1 and 45.

Claims 4-6, 10, and 17 depend from claim 1. Accordingly, at least for the reasons recited above with respect to claim 1, Applicant asserts that these claims are also patentable over Tsilevich, either alone or in combination with the other references cited by the Examiner. (Applicant does not address claims 2 and 15, which are cancelled herein).

Additionally, for the reasons set forth below with respect to claim 55, Applicant submits that claim 10, which additionally recites that the at least one energy absorbing layer is a first plate, is patentable over Tsilevich.

Claim 55 as amended recites:

> An article of manufacture comprising at least one energy absorbing plate, said at least one energy absorbing plate consisting essentially of a metallic material, said metallic material being at least one of a metallic material that undergoes a reversible phase change upon absorbing energy and a metallic material that exhibits an elastic strain deformation of at least 5%, wherein the article of manufacture is an armor plate.

In the Office Action at page 4, the Examiner asserts that either item 22 or item 37 (shown in Figs. 2 and 3, respectively) of Tsilevich can be relied upon to meet the limitation of a "plate". Further, the Examiner defines a plate as "a thin flat sheet or piece of metal or other material." Office Action at page 4, citing Webster's Encyclopedic Unabridged Dictionary (1996).

However, Applicant respectfully submits that the zigzag strip of Tsilevich is not a plate, either under the Examiner's definition or the definitions set forth by the Applicant

in the Applicant's Response dated June 7, 2004. As described and as shown in Tsilevich, the "zigzag strip" is not flat but bent in a "zigzag" configuration. As previously discussed, Tsilevich states that "strip 22 tries to regain the flat shape it had prior to being bent." Further, at col. 3, lines 50-56 (and with reference to Fig. 3), Tsilevich indicates that item 37 is a zigzag strip. Accordingly, Applicant asserts that the Tsilevich does not teach or suggest an article of manufacture as set forth in amended claim 55.

Further, there is no motivation in Tsilevich, either alone or in combination with the other references cited by the Examiner, to form an article of manufacture as recited in claim 55. As previously discussed, one essential aspect of zigzag strip in Tsilevich is that the strip is bent into a zigzag configuration and on heating it attempts to regain the flat shape it had prior to being bent. Accordingly, one skilled in the art would not be motivated by the disclosure in Tsilevich to make an article of manufacture as recited in amended claim 55.

Amended claim 57 recites, in pertinent part (with emphasis added), "an armored vehicle including an armor *plate*, said armor plate comprising at least one energy absorbing *plate*...." At least for the reasons discussed above with respect to claim 55, Applicant asserts that claim 57 is also patentable over Tsilevich, either alone or in combination with the other references cited by the Examiner.

Amended claims 56 and 58 recite, in pertinent part (with emphasis added):

> ...armor comprising a first *plate* comprising at least one energy absorbing layer consisting essentially of a metallic material, said metallic material being at least one of a metallic material that undergoes a reversible phase change upon absorbing energy and a metallic material that exhibits an elastic strain deformation of at least 5%; a second *plate contiguous with and metallurgically bonded to at least a portion of said first plate...*; and *a third plate disposed opposite said second plate and being contiguous with and metallurgically bonded to at least a portion of said first plate....*

At least for the reasons set forth above with respect to claims 1, 45, and further for the reasons set forth above with respect to claim 55, Applicant asserts that amended claims 56 and 58 are also patentable over Tsilevich, either alone or in combination with the other references cited by the Examiner.

Rejections Under 35 U.S.C. §103(a) based on Tsilevich in Combination with Other Cited References

With respect to the Examiner's rejection of claims 11 and 18 over Tsilevich in view of Dobbs, Applicant asserts, at least for the reasons set forth above with respect to claim 1, that claims 11 and 18, which indirectly depend from claim 1, are patentable over this combination of references.

With respect to the Examiner's rejection of claims 7 and 8 over Tsilevich in view of Jackson et al. or Buehler et al., Applicant asserts, at least for the reasons set forth above with respect to claim 1, that claims 7 and 8, which indirectly depend from claim 1, are patentable over this combination of references.

With respect to the Examiner's rejection of claims 19-23 over Tsilevich in view of Jackson et al. or Buehler et al., and further in view of Dobbs, Applicant asserts, at least for the reasons set forth above with respect to claim 1, that claims 19 and 21-23, which depend either directly or indirectly from claim 1, are patentable over this combination of references. (Applicant does not address claim 20, which is cancelled herein).

Rejections Under 35 U.S.C. §102(a) based on Paine et al.

In the Office Action, the Examiner rejects claims 1-2, 4-6, 9-10, 15, 17, 45, and 55-58 under 35 U.S.C. §102(b) based on Paine et al. According to the Examiner, Paine et al. discloses an armor comprising:

a) a metallic material that undergoes a reversible phase change;

b) a second energy absorbing layer that exhibits an elastic strain deformation of at least 5%;

c) phase change at between -50°C and 200°C;

d) a metallic material that is Nitinol;

e) a second plate; and

f) a third plate.

Applicant respectfully asserts that Paine et al. does not teach or disclose all of the elements of amended claims 1, 45, and 55-58, and therefore does not anticipate these claims.

As amended claims 1, 45, 56 and 58 recite "at least one energy absorbing layer consisting essentially of a metallic material" and claims 55 and 57 recite "at least one energy absorbing plate consisting essentially of a metallic material."

The Examiner indicates at page 5 of the Office Action that Paine et al. indicates that "layer 26 that is comprised of SMAC materials (col. 8, lines 10-11). Consequently, the material layer 26 is a material layer of a shape memory alloy materials." However, Applicant notes Paine et al. further states "[t]he surface composites that make up the *hybrid layer 26* were custom made nitinol/epoxy (nit/ep) using a superelastic nitinol, a kevlar/epoxy (3502/Kevlar-49), and a custom made high strength aluminum wire laminated with epoxy (alu/ep)." Col. 8, lines 20-24 (emphasis added). Thus, Paine et al. indicates that layer 26, like the other plies taught in Paine et al., is a composite material.

As indicated above, Applicant has amended claims 1, 45, and 55-58 to more particularly point out that the at least one layer (or plate) of an energy absorbing material is primarily a metallic material. Since Paine et al. does not teach or suggest a layer (or plate) consisting essentially of a metallic material as set forth in these claims, Applicant asserts that claims 1, 45, and 55-58 are patentable over Paine et al., either alone or in combination with the other references cited by the Examiner.

Further, claims 1 and 45 recite that at least one second layer of a metallic material is *metallurgically bonded* to the at least one energy absorbing layer; and claims 56 and 58 recite that a second plate of a metallic material is *metallurgically bonded* to a portion of the first plate (which comprises at least one energy absorbing layer), and further recite that a third plate of a metallic material is *metallurgically bonded* to a portion of the first plate. However, Paine et al. teaches that "[t]he hybrid surface plies 26 were laminated the [sic] graphite and glass substrates 20 using standard cure methods (vacuum bag cure with Epon 828 resin)." Col. 8, lines 59-62. Accordingly, Applicant submits that there is no teaching or suggestion in Paine et al. to form a metallurgical bond between the plies taught in Paine et al. as required by claims 1, 45, 56 and 58.

Since claims 4-6, 9-10 and 17 depend from claim 1, at least for the reasons set forth above with respect to claim 1, Applicant asserts that these claims are patentable over Paine et al. (Applicant does not address claims 2 and 15, which are cancelled herein).

Rejections Under 35 U.S.C. §103(a) based on Tsilevich in Combination with Other Cited References

With respect to the Examiner's rejection of claim 46 over Paine et al. in view of Turner, Applicant asserts, at least for the reasons set forth above with respect to claim 45, that claim 46, which depends from claim 45, is patentable over this combination of references.

With respect to the Examiner's rejection of claim 16 over Paine et al. in view of Vecchio, Applicant asserts, at least for the reasons set forth above with respect to claim 1, that claim 16, which indirectly depends from claim 1, is patentable over this combination of references.

With respect to the Examiner's rejection of claims 19-23 over Paine et al. in view of either Jackson et al. or Buehler et al., and further in view of Dobbs, Applicant asserts, at least for the reasons set forth above with respect to claim 1, that claims 19 and 21-23, which depend either directly or indirectly from claim 1, are patentable over this combination of references. (Applicant does not address claim 20, which is cancelled herein).

With respect to the Examiner's rejection of claims 7 and 8 over Paine et al. in view of Jackson et al. or Buehler et al., Applicant asserts, at least for the reasons set forth above with respect to claim 1, that claims 7-8, which indirectly depend from claim 1, are patentable over this combination of references.

Claim Objection

In the Office Action, the Examiner objects to claim 13 as being dependent upon a rejected base claim, but indicates that claim 13 would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims. For the foregoing reasons, Applicant asserts that claim 10, from which claim 13 depends, and claim 1, from which claim 10 depends, are patentable over the references cited by the Examiner. Accordingly, Applicant submits that claim 13 is also in condition for allowance and requests that the Examiner reconsider and allow the same.

* * * * *

CONCLUSION

After entry of the above amendments, claims 1, 4-14, 16-19, 21-23, 45, 46, and 55-58 are pending, of which claims 12 and 14 are withdrawn from consideration. For the foregoing reasons, Applicant respectfully submits that pending claims are now in condition for allowance and requests that the Examiner reconsider and allow the same.

Additionally, as indicated in the Office Action issued on July 15, 2003, upon allowance of a generic claim, Applicant is entitled to consideration of claims to additional, non-elected species that are written in dependent form or otherwise include all the limitations of an allowed generic claim. Applicant submits that claim 1 is a generic claim that is in a condition for allowance by the Examiner. Accordingly, since each of the non-elected species are embraced by an allowable generic claim, Applicant requests that the Examiner withdraw his restriction requirement as to the encompassed species and consider claims 12 and 14, which are drawn to the non-elected species.

Should the Examiner have any questions regarding the foregoing, the Examiner is requested to contact the undersigned.

Respectfully Submitted,

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